

Unit 14

Day 5

Applications

Maximum and Minimum

Do #3, 4, 5

1) A ball is thrown straight up with an initial velocity of 64 feet per second. The height of the ball  $t$  seconds after it is thrown is given by the formula  $h=64t-16t^2$ . After how many seconds will it reach its maximum height? What will this maximum height be?

at  
of  
sym.  $\Rightarrow t = \frac{-b}{2a} = \frac{-64}{-32} = 2$

$$h(2) = 64(2) - 16(2)^2$$

It would take 2 seconds  
for the ball to reach its  
maximum height of 64 ft

2) Dave has 120 feet of fence to make a rectangular kennel for his dog. If the house is used as one side of the kennel, what should the dimensions be to produce the maximum area?

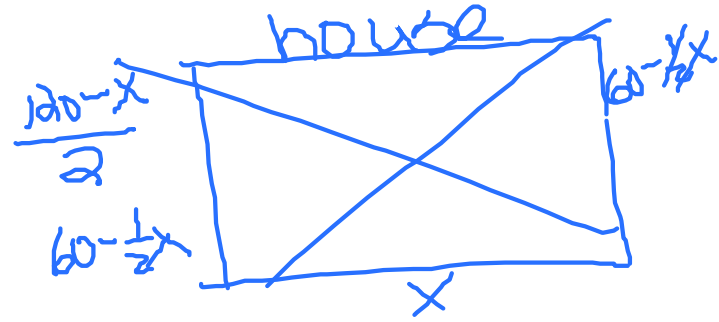
$$A = l w$$

$$A(x) = (120 - 2x)x$$

$$A(x) = 120x - 2x^2$$

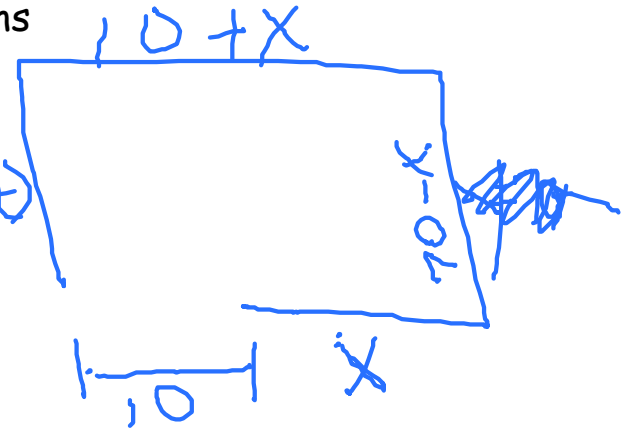
$$x = \frac{-120}{-4} = 30$$

$$30' \times 60'$$



3) Melissa plans to put a fence around her rectangular garden. She has 150 feet of fencing material to make the fence. If there is to be a 10-foot opening left for an entrance on one side of the garden, what dimensions should the garden be for maximum area?

let  $x$  = length of side w/ opening (ft)  
 let  $y$  = " " " "  $\perp$  to opening (ft)  
 $= 70 - x$



$$y = \frac{150 - (10 + x) - x}{2} = \frac{140 - 2x}{2} = 70 - x$$

$$A = l w$$

$$A(x) = (10 + x)(70 - x)$$

$$A(x) = -x^2 + 60x + 700$$

$$x = \frac{-b}{2a} = \frac{-60}{2} = 30$$

$$40' \times 40'$$

4) An object is fired upward from the top of a 200-foot tower at a velocity of 80 feet per second. The height of the object  $t$  seconds after firing is given by the formula  $h = -16t^2 + 80t + 200$ . After how many seconds will the object reach its maximum height? What will this maximum height be?

$$t = \frac{-b}{2a} = \frac{-80}{2(-16)} = \frac{80}{32} = 2.5 \text{ Seconds}$$

$$h = -16(2.5)^2 + 80(2.5) + 200$$

300 ft max height

5) Five hundred feet of chain link fence will be used to construct eight cages in a kennel. Find the dimensions that maximize the entire enclosed area for the cages. Do not assume that each cage is a square.

$$5y + 3x = 500$$

$$5y = -3x + 500$$

$$y = -\frac{3}{5}x + 100$$

$$A = lw$$

$$A(x) = x(-\frac{3}{5}x + 100)$$

$$A(x) = -\frac{3}{5}x^2 + 100x$$

$$\boxed{83\frac{1}{3} \times 50}$$



$$\boxed{83\frac{1}{3}}$$

$$x = \frac{-b}{2a} = \frac{-100}{-\frac{6}{5}} = \frac{500}{6}$$

$$x = \frac{250}{3} = 83\frac{1}{3}$$

$$y = -\frac{3}{5}(83\frac{1}{3}) + 100 = 50$$

## HOMework:

Max and Min Worksheet 1-7